

App. No. : 10/601,037
Filed : June 19, 2003

REMARKS

After entry of the present amendments, Claims 15-42 will be pending in the present application. Claims 1-3 and 5-14 are cancelled herein. The specification is amended to correct the priority claim and to reference related applications. The amendments do not add new matter.

Applicants are pleased to note that the rejections under 35 U.S.C. §102 have been withdrawn. The remaining rejections under 35 U.S.C. §103 are addressed below.

Claim Rejections Under 35 U.S.C. § 103

Claims 1-3, 5-24, 27, 28, 33-38 and 40-42 were rejected under 35 U.S.C. § 103(a) as unpatentable over Bai et al. (U.S. 6,166,417) in view of Elers et al. (WO 01/29893). Claims 1-14 have been cancelled. In rejecting independent Claim 15, the Examiner argues that Bai does not disclose that the dielectric layer is a nanolaminate or that it is deposited by ALD. This deficiency is found to be made up for by the teaching of Elers.

First, Applicants respectfully point out that Claim 15 does not recite the deposition of a nanolaminate barrier layer. Second, Applicants submit that the Examiner has provided no motivation for the combination of Bai and Elers. As discussed previously, while Elers teaches barrier layers, the disclosure in Elers is in a completely different context. Elers teaches the formation of barrier layers in the context of dual damascene structures, not in the context of metal gates. The Examiner has provided no teaching or suggestion to form a barrier layer by atomic layer deposition in the context of metal gates.

Deposition of barrier layers in the dual damascene context requires a high conformality process. Thus, the step coverage advantage of ALD would be beneficial. However, ALD has a number of properties that make it undesirable in situations in which high conformality is not required. Foremost of these is that the monolayer by monolayer deposition by ALD is much slower than other methods that deposit multiple monolayers in each cycle, such as CVD. The high cost of an ALD process where it is not necessary would be prohibitive.

Here, because high conformality is not needed in the context of Bai's metal gates, one of skill in the art would not be motivated to select ALD as the deposition method. Elers' motivation for using ALD (conformality) is absent in the asserted combination, and the Examiner has not provided any other motivation to combine these references.

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In addition, the Examiner has provided no teaching or suggestion in either Bai or Elers for depositing the dielectric layer by atomic layer deposition as recited in Claim 15. No additional references are cited that make up for this lack of teaching.

As the Examiner has provided no motivation to combine the teachings of Bai and Elers, and such a combination does not teach or suggest deposition of a dielectric layer by ALD, Applicants submit that a prima facie case of obviousness has not been established and request withdrawal of the rejection.

Conclusion


In view of the arguments and amendments presented above, Applicants submit that the present application is in condition for allowance and request the same. If any issues remain, the Examiner is invited to contact Applicants' representative at the number provided below in order to resolve such issues promptly.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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